



226800

**LAKESHORE EAST**  
**STANDARD OPERATING PROCEDURE**

Title: Gamma Radiological Surveys

Document: SOP-210

Revision Number: 1

Date: September 13, 2002

Replaces: June 19, 2002

## **GAMMA RADIOLOGICAL SURVEYS**

### **1.0 PURPOSE**

This procedure provides protocols for pre-verification or verification gamma radiological surveys.

### **2.0 SCOPE**

Radiological surveys will be performed at the designated Site as part of the pre-excavation, excavation, pre-verification, and/or verification surveying programs.

### **3.0 REFERENCES**

None.

### **4.0 EQUIPMENT AND MATERIALS**

The following equipment may be used as part of the survey programs. Other equipment may be substituted if necessary because of availability of the items listed or the conditions encountered at the site.

- Trimble Pathfinder Pro XL 4.1 GPS (optional).
- 2-inch by 2-inch NaI (TI) gamma detector.
- Ludlum Model 2221 portable scaler ratemeter analyzer.

### **5.0 INSTRUCTIONS FOR RADIOLOGICAL SURVEY**

#### **5.1 Establishment of Background Gamma Count Rate**

- 5.1.1 The gamma count rate background levels shall be established for each applicable survey instrument. Six randomly selected locations shall be chosen in non-radiologically impacted areas of the Site. A one-minute integrated count shall be obtained at the surface of each location for each survey instrument (Ludlum 2221 with 2" X 2" NaI probe). The measurements collected from each location shall be averaged to establish an instrument specific background gamma count rate.

#### **5.2 Land Survey Procedure**

- 5.2.1 Two perpendicular baselines will be established.
- 5.2.2 A grid along the baseline will be established using cloth or steel tape and a compass, if necessary. Stakes, survey flags, or paint will be placed as needed to delineate grid or traverse lines. The grids will be spaced about five meters apart.
- 5.2.3 The baseline, permanent structures, areas of remediation, and other areas of interest will be illustrated in the field logbook.

#### **5.3 Gamma Survey Procedure**

- 5.3.1 The Ludlum ratemeter is set for 2-second time-weighted average count rate.
- 5.3.2 Hold the survey meter probe parallel to the ground surface at a height of approximately two to six inches.
- 5.3.3 Walk along grid lines at a maximum speed of about 0.5 meters per second (1 mile per hour).

5.3.4 Continue surveying until all survey grids have been traversed.

#### 5.4 Radiological Survey of On-Site Materials

5.4.1 Material that is excavated and placed in the clean stockpile will be surveyed two times. The first survey will be performed prior to excavation activities.

5.4.2 The second survey will be performed during the excavation of the non-contaminated soil.

The soils will be surveyed before they are placed in the stockpile. Based on the gamma scan, the material will either be designated as contaminated material and immediately loaded for transportation and disposal or tentatively designated as clean and stockpiled for subsequent soil sampling per SOP-214.

#### 5.5. Daily Surveys

5.5.1 Routine daily surveys shall be performed for each day of operations at the site.

5.5.2 The routine surveys will monitor areas in the immediate vicinity of excavations and along soil movement paths to ensure that radiation levels are not affected by activities.

5.5.3 Routine surveys shall be documented by preparing a drawing of the survey results in the field logbook, indicating either the location and value of individual measurements, or contours of the measured gamma field.

5.5.4 Surveys of excavation areas will be made at the request of the Field Team Leader to assess the progress of the removal. These surveys will not be documented, but will be used by the Field Team Leader to manage the excavation.

#### 5.6 Pre-Verification or Verification Survey

5.6.1 Upon completion of excavation activities, either a pre-verification survey shall be performed to ensure that the excavation is ready for a final verification survey by USEPA or a verification survey shall be performed to ensure that the excavation is ready for backfill based on USEPA approval.

5.6.2 The survey is conducted at the same time as the excavation work phase. The survey method is performed as specified in Sections 5.2 and 5.3. Upon completion of the survey and excavation phase, a Notification of Successful Pre-Verification or Verification is sent to the USEPA requesting a final verification survey or approval to backfill.

#### 5.7 Site Grading Survey

5.7.1 Surveys will likely be conducted at the same time as the grading activities and will be performed as specified in Section 5.3 of this SOP.

5.7.2 The corners or boundaries of the area to be surveyed will be tied into a site-wide coordinate/survey network. Stakes, survey flags, or paint will be placed along the boundaries of the survey area using a cloth/steel tape or wheel at approximately 100 foot intervals to subdivide the area into 100 ft X 100 ft areas.

5.7.3 Each 100 X 100 ft areas will be traversed using a line spacing of approximately 10 feet. Readings greater than twice background will be painted and flagged for further investigation.

5.7.4 The maximum gamma count and/or readings over twice background will be recorded on a 50 ft X 50 ft grid on the radiation survey form for site grading (Appendix A). Permanent structures and other issues of interest also will be included on the radiation survey form.



# RADIATION SURVEY FORM – GRADING

STS Consultants, Ltd.

Project # \_\_\_\_\_

Project Name \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_

Date \_\_\_\_\_

Technician \_\_\_\_\_

Inst. Model \_\_\_\_\_

Serial No. \_\_\_\_\_

Inst. Calibrated (Y/N)? \_\_\_\_\_ Lift Elevation \_\_\_\_\_

Write the area coordinates in the large circles. Indicate boundaries of grading/excavation with a heavy line. Survey areas in accordance with Section 5.7 of SOP-210. Within each grid record the maximum cpm. If detected, shade areas of elevated gamma readings (> twice background) and record max cpm.